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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Suryanarayanan et al.	§	
	§	Group Art Unit: 3768
Serial No.: 10/723,192	§	
	§	Examiner: Bemben, Richard M.
Filed: November 25, 2003	§	
	§	
For: METHOD AND APPARATUS FOR SEGMENTING STRUCTURE IN CT ANGIOGRAPHY	§	Atty. Docket: 140312-1/YOD
	§	GERD:0073
	§	

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RESPONSE TO NON-COMPLIANT APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.37

This Paper is being filed in furtherance to a response to a non-compliant appeal brief mailed on December 19, 2007, which required a clean copy of the appealed claims.

Remarks

In response to the Notification of Non-Compliant Appeal Brief, the Appellant has included a clean copy of the appealed claims as required. If the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

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8. APPENDIX OF CLAIMS ON APPEAL

Listing of Claims:

The following is a listing of the claims in accordance with 37 C.F.R. §1.121.

1. (Previously Presented) A method for generating a bone mask, comprising the steps of:

acquiring an image data set;

pre-processing the image data set to automatically calculate at least one or more seed points and one or more structure edges;

generating a preliminary bone mask to differentiate bone and vascular structures from the image data set, wherein the preliminary bone mask is generated for a plurality of sub-volumes comprising the image data set, based upon a spatial relationship between the bone and the vascular structures in the plurality of sub-volumes, and wherein each sub-volume is differentially processed based upon the spatial relationship between the bone and the vascular structures in the sub-volume;

automatically determining the vascular structure using the one or more seed points, the one or more structure edges, and the image data; and

subtracting the vascular structure from the preliminary bone mask to generate a bone mask.

2. (Original) The method as recited in claim 1, comprising the step of:

subtracting the bone mask from the image data set to generate a bone-free volume data set.

3. (Original) The method as recited in claim 2, comprising the step of:

rendering the bone-free volume data set to generate a bone-free volumetric rendering.

4. (Original) The method as recited in claim 1, wherein acquiring the image data set comprises acquiring a CTA data set of a head and neck region.

5. (Original) The method as recited in claim 1, wherein the step of pre-processing the image data set calculates the one or more seed points using at least one of a geometric template and a functional template.

6. (Original) The method as recited in claim 1, wherein the step of pre-processing the image data set calculates the one or more structure edges by determining a maximum absolute gradient for each voxel relative to the adjacent voxels.

7. (Previously Presented) The method as recited in claim 1, wherein pre-processing the image data set comprises partitioning the image data set into the plurality of sub-volumes.

8. (Previously Presented) The method as recited in claim 7, wherein the vascular structure is automatically determined based upon the differential processing applied to the plurality of sub-volumes.

9. (Original) The method as recited in claim 8, wherein differentially processing comprises implementing a fast algorithm in at least one sub-volume and a complex vessel tracking algorithm in at least one other sub-volume.

10. (Original) The method as recited in claim 1, wherein pre-processing the image data set comprises removing a portion of the image data set corresponding to a table.

11. (Original) The method as recited in claim 1, wherein generating the preliminary bone mask comprises classifying voxels as bone based on at least intensity.

12. (Original) The method as recited in claim 1, wherein automatically determining the vascular structure comprises applying at least one of a dynamic constrained region growing process, a bubble wave connectivity process, and a ray and contour propagation process.

13. (Original) The method as recited in claim 1, comprising the step of smoothing the vascular structure.

14. (Previously Presented) A computer program, provided on one or more computer readable media, for generating a bone mask, comprising:

a routine for acquiring an image data set;

a routine for pre-processing the image data set to automatically calculate at least one or more seed points and one or more structure edges;

a routine for generating a preliminary bone mask to differentiate bone and vascular structures from the image data set, wherein the preliminary bone mask is

generated for a plurality of sub-volumes comprising the image data set, based upon a spatial relationship between the bone and the vascular structures in the plurality of sub-volumes, wherein each sub-volume is differentially processed based upon the spatial relationship between the bone and the vascular structures in the sub-volume;

a routine for automatically determining the vascular structure using the one or more seed points, the one or more structure edges, and the image data; and

a routine for subtracting the vascular structure from the preliminary bone mask to generate a bone mask.

15. (Original) The computer program as recited in claim 14, comprising a routine for subtracting the bone mask from the image data set to generate a bone-free volume data set.

16. (Original) The computer program as recited in claim 15, comprising a routine for rendering the bone-free volume data set to generate a bone-free volumetric rendering.

17. (Original) The computer program as recited in claim 14, wherein the routine for acquiring the image data set acquires a CTA data set of a head and neck region.

18. (Original) The computer program as recited in claim 14, wherein the routine for pre-processing the image data set calculates the one or more seed points using at least one of a geometric template and a functional template.

19. (Original) The computer program as recited in claim 14, wherein the routine for pre-processing the image data set calculates the one or more structure edges by determining a maximum absolute gradient for each voxel relative to the adjacent voxels.

20. (Previously Presented) The computer program as recited in claim 14, wherein the routine for pre-processing the image data set partitions the image data set into the plurality of sub-volumes.

21. (Previously Presented) The computer program as recited in claim 20, wherein the routine for automatically determining the vascular structure is based on the differential processing applied to the plurality of sub-volumes.

22. (Original) The computer program as recited in claim 21, wherein differentially processing comprises implementing a fast algorithm in at least one sub-volume and a complex vessel tracking algorithm in at least one other sub-volume.

23. (Original) The computer program as recited in claim 14, wherein the routine for pre-processing the image data set removes a portion of the image data set corresponding to a table.

24. (Original) The computer program as recited in claim 14, wherein the routine for generating the preliminary bone mask classifies voxels as bone based on at least intensity.

25. (Original) The computer program as recited in claim 14, wherein the routine for automatically determining the vascular structure applies at least one of a dynamic constrained region growing process, a bubble wave connectivity process, and a ray and contour propagation process.

26. (Original) The computer program as recited in claim 14, comprises a routine for smoothing the vascular structure.

27. (Previously Presented) A CT image analysis system, comprising:

an X-ray source configured to emit a stream of radiation;

a detector configured to detect the stream of radiation and to generate one or more signals responsive to the stream of radiation, wherein the detector comprises a plurality of detector elements;

a system controller configured to control the X-ray source and to acquire a set of image data from one or more of the detector elements via a data acquisition system; and

a computer system configured to receive the set of image data, to pre-process the set of image data to automatically calculate at least one or more seed points and one or more structure edges, to generate a preliminary bone mask to differentiate bone and vascular structures from the set of image data, wherein the preliminary bone mask is generated for a plurality of sub-volumes comprising the image data set, based upon a spatial relationship between the bone and the vascular structures in the plurality of sub-volumes, wherein each sub-volume is differentially processed based upon the spatial relationship between the bone and the vascular structures in the sub-volume; to automatically determine the vascular structure using the one or more seed points, the one or more structure edges, and the set of image data, and to subtract the vascular structure from the preliminary bone mask to generate a bone mask.

28. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to subtracting the bone mask from the set of image data to generate a bone-free volume data set.

29. (Original) The CT image analysis system as recited in claim 28, wherein the computer system is configured to render the bone-free volume data set to generate a bone-free volumetric rendering.

30. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to pre-process the set of image data by calculating the one or more seed points using at least one of a geometric template and a functional template.

31. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to pre-process the set of image data by calculating the one or more structure edges by determining a maximum absolute gradient for each voxel relative to the adjacent voxels.

32. (Previously Presented) The CT image analysis system as recited in claim 27, wherein the computer system is configured to pre-process the set of image data by partitioning the image data set into the plurality of sub-volumes.

33. (Previously Presented) The CT image analysis system as recited in claim 32, wherein the computer system is configured to automatically determine the vascular structure based on the differential processing applied to the plurality of sub-volumes.

34. (Original) The CT image analysis system as recited in claim 33, wherein differentially processing comprises implementing a fast algorithm in at least one sub-volume and a complex vessel tracking algorithm in at least one other sub-volume.

35. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to pre-process the set of image data by removing a portion of the image data set corresponding to a table.

36. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to generate the preliminary bone mask by classifying voxels as bone based on at least intensity.

37. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to automatically determine the vascular structure by applying at least one of a dynamic constrained region growing process, a bubble wave connectivity process, and a ray and contour propagation process.

38. (Original) The CT image analysis system as recited in claim 27, wherein the computer system is configured to smooth the vascular structure.

39. (Previously Presented) A CT image analysis system, comprising:

means for acquiring an image data set;

means for pre-processing the image data set to automatically calculate at least one or more seed points and one or more structure edges;

means for generating a preliminary bone mask to differentiate bone and vascular structures from the image data set, wherein the preliminary bone mask is generated for a plurality of sub-volumes comprising the image data set, based upon a spatial relationship between the bone and the vascular structures in the plurality of sub-volumes, wherein each sub-volume is differentially processed based upon the spatial relationship between the bone and the vascular structures in the sub-volume;

means for automatically determining the vascular structure using the one or more seed points, the one or more structure edges, and the image data; and

means for subtracting the vascular structure from the preliminary bone mask to generate a bone mask.